

# REMARKS

This Preliminary Amendment submits new claims 25-38 presented above. The new claims have been added to ensure that claims corresponding to issued claims in U.S. Patents 6,264,798 and 6,241,855 have been presented for examination within one year of the date of issuance as required by 35 U.S.C. §135(b).

Support for the new claims may be found as shown in the following chart:

<p>25. A delayed coking heater for heating a coker feedstock comprising:</p>	<p>p.3, l. 28-29 “coke heater for a delayed coking process” p. 1, l. 8 “heater for use in heating the coking feedstock”</p>
<p>a first convection section;</p>	<p>p. 7, l. 23-25 “The feedstock enters the coking furnace 11 through the heater inlet (first end) and convection section (not shown) and then to the radiant section 22 inlet 21.”</p>
<p>a second radiant section adjacent to said first convection section, said second section transmitting heat to said feedstock predominantly by radiant means;</p>	<p>p. 9, l. 8-10 “The flue gas 26 from the burners 24 is shown [in FIG. 3] exiting the coking furnace radiant section 22...via exhaust duct 27 typically to the coking furnace 11 convection section.” This suggests that the radiant section is adjacent to the convection section.  p. 7, l. 25-26 “and then to the radiant section 22 inlet 21. Radiant section 22 does not solely transmit heat to the feedstock in tubes 18 by radiant means, but does so predominantly by radiation, and thus this section 22 is termed a radiant section.”</p>

<p>a heating conduit in said radiant section comprising a plurality of horizontal heater tubes located in the center of the coking heater and horizontally offset from one another so as to form double vertical columns;</p>	<p>p. 1, l. 21  “heating the feedstock in the conduit or tubing of a tube heater”  p. 9, l. 14  “tube bundle 36 is in the radiant heating section”  p. 8, l. 13-14  “heater tubes . . . are located in the center of the coking furnace”  p. 4, l. 13-15  “where at least a portion of the tubes are arranged in a plurality of vertical columns and are horizontally offset from one another”  p. 9, l. 26  “two offset vertical columns”  p. 11, l. 6-7  “double vertical staggered columns of tubes”</p>
<p>wherein said heater tubes are sequentially linked by tube bends so as to form a tube bundle; and</p>	<p>p. 8, l. 1-2  “horizontal heater tubes 18 are sequentially linked by tube bends”  Abstract  “tube bends connecting adjacent tubes”  p. 7, l. 29-30  “heater tubes 18 are connected by a plurality of long radius bends 19 located at the ends of the heater tubes 18.”  p. 9, l. 3-4  “All of the tubes 18 may be collectively known as a tube bundle 36.”</p>
<p>a plurality of burners located on each side of said heater tubes.</p>	<p>p. 9, l. 5-7  “Also shown in FIG. 3 are burners 24 and flames 25 located on each side of the tube bundle, between the tube bundle and the side walls 32 and 33 of the coking furnace 11.”  See also Fig. 3</p>

<p>26. A heater according to claim 25 wherein said heating conduit comprises a plurality of continuous and generally horizontal tubes sequentially linked together by a plurality of tube bends extending from a heater inlet at the top of said radiant section to an outlet at the bottom of said radiant section.</p>	<p>p. 4, l. 11-13  “tube bundle including a plurality of continuous horizontal tubes . . . sequentially linked together by a plurality of tube bends”</p> <p>p. 8, l. 1-2  “generally horizontal heater tubes”</p> <p>p. 8, l. 6-8  “FIG. 2 shows that the feedstock enters at the top of the coking furnace 11 (heater inlet 21 is at the top) and exits at the bottom of the coking furnace 11 (outlet 20 is at the bottom)”</p>
<p>27. A heater according to claim 26 wherein at least a portion of said tubes are arranged in two offset vertical columns having a serpentine pattern.</p>	<p>p. 4, l. 13-15  “where at least a portion of the tubes are arranged in a plurality of vertical columns and are horizontally offset from one another”</p> <p>p. 9, l. 26  “two offset vertical columns”</p> <p>Abstract;  “It has been discovered that the tubes within a radiant heating section of a coking furnace can be advantageously arranged differently than in a single vertical column and connected together in a simple, planar serpentine pattern.”</p> <p>Fig. 2  (see “serpentine-like” configuration of tubing)</p>
<p>28. A heater according to claim 27 wherein said heater tubes are horizontally and vertically displaced so as to have a staggered configuration.</p>	<p>p. 8, l. 21-23  “heater tubes 18 as viewed “end on” in FIG. 3 are horizontally and vertically displaced from the heater tubes 18 in the other column, and thus have a “staggered” configuration with respect to each other.”</p>
<p>29. A heater according to claim 25 wherein said heating conduit comprises a plurality of continuous and generally horizontal tubes sequentially linked together by a plurality of tube bends extending from an upper portion of said radiant section to outlet tubes in the lower portion of said radiant section.</p>	<p>p. 4, l. 11-13  “tube bundle including a plurality of continuous horizontal tubes . . . sequentially linked together by a plurality of tube bends”</p> <p>p. 8, l. 1-2  “generally horizontal heater tubes”</p> <p>p. 5, l. 10-22  “upper tubes in a radiant section . . . staggering the orientation of the upper tubes can bring them lower in the furnace . . . the outlet tubes which have a greater tendency to coke deposition have a lower heat flux”</p>

<p>30. A heater according to claim 29 wherein said plurality of continuous and generally horizontal tubes sequentially linked together by a plurality of tube bends have a serpentine pattern.</p>	<p>Abstract;          "It has been discovered that the tubes within a radiant heating section of a coking furnace can be advantageously arranged differently than in a single vertical column and connected together in a simple, planar serpentine pattern."          Fig. 2          (see "serpentine-like" configuration of tubing)</p>
<p>31. A heater according to claim 30 wherein said plurality of continuous and generally horizontal tubes sequentially linked together by a plurality of tube bends are horizontally and vertically displaced so as to have a staggered configuration.</p>	<p>p. 8, l. 21-23          "heater tubes 18 as viewed "end on" in FIG. 3 are horizontally and vertically displaced from the heater tubes 18 in the other column, and thus have a "staggered" configuration with respect to each other."</p>
<p>32. A heater according to claim 25 wherein said burners are located in a lower portion of said radiant section on each side of the conduit, between the conduit and the side walls.</p>	<p>p. 5, l. 13          "upper tubes in a radiant section farther from the burners"          p. 9, l. 5-7          "Also shown in FIG. 3 are burners 24 and flames 25 located on each side of the tube bundle, between the tube bundle and the side walls 32 and 33 of the coking furnace 11."          See also Fig. 3</p>
<p>33. A delayed coking heater for heating a coking feedstock comprising:</p>	<p>p.3, l. 28-29          "coke heater for a delayed coking process"          p. 1, l. 8          "heater for use in heating the coking feedstock"</p>
<p>a first convection section;</p>	<p>p. 7, l. 23-25          "The feedstock enters the coking furnace 11 through the heater inlet (first end) and convection section (not shown) and then to the radiant section 22 inlet 21."</p>

<p>a second radiant section adjacent to said first convection section, said second section transmitting heat to said feedstock by radiant means;</p>	<p>p. 9, l. 8-10          "The flue gas 26 from the burners 24 is shown [in FIG. 3] exiting the coking furnace radiant section 22...via exhaust duct 27 typically to the coking furnace 11 convection section." This suggests that the radiant section is adjacent to the convection section.</p> <p>p. 7, l. 25-26          "and then to the radiant section 22 inlet 21. Radiant section 22 does not solely transmit heat to the feedstock in tubes 18 by radiant means, but does so predominantly by radiation, and thus this section 22 is termed a radiant section."</p>
<p>a feedstock heater inlet at the bottom of said radiant section;</p>	<p>p. 8, l. 6-11          "Although FIG. 2 shows that the feedstock enters at the top of the coking furnace 11 (heater inlet 21 is at the top) and exits at the bottom of the coking furnace 11 (outlet 20 is at the bottom), the invention is not necessarily limited to this configuration, although this is the more conventional flow direction. It is anticipated that the invention could be used in a design where the feedstock flows the other direction."</p>
<p>a heating conduit in said radiant section comprising a plurality of horizontal heater tubes sequentially linked by tube bends to allow flow of feedstock from the bottom to the top of said heater;</p>	<p>p. 1, l. 21          "heating the feedstock in the conduit or tubing of a tube heater"</p> <p>p. 9, l. 14          "tube bundle 36 is in the radiant heating section"</p> <p>p. 8, l. 1-2          "horizontal heater tubes are sequentially linked by tube bends"</p> <p>p. 8, l. 6-11          see above</p>
<p>a heater outlet at the top of said radiant section;</p>	<p>p. 8, l. 6-11          see above</p>

<p>a plurality of burners located in a lower portion of said radiant section on each side of said heater tubes.</p>	<p>p. 5, l. 13  “upper tubes in a radiant section farther from the burners”  p. 9, l. 5-6  “Also shown in FIG. 3 are burners 24 and flames 25 located on each side of the tube bundle, between the tube bundle and the side walls 32 and 33 of the coking furnace 11.”  See also Fig. 3</p>
<p>34. A heater according to claim 33 further comprising a plurality of conventionally arranged single column planar tube bundles.</p>	<p>p. 11, l. 5-7  “specific combinations of conventionally arranged, single-column planar serpentine tube bundles with double vertical staggered columns of tubes in accordance with this invention may be used.”</p>
<p>35. A heater according to claim 33 wherein said heating conduit comprises double vertical staggered columns.</p>	<p>p. 11, l. 6-7  “double vertical staggered columns of tubes”  see also p. 8, l. 13-15 (“two vertical columns”); p. 9, l. 26 (“two offset vertical columns”;  see also Fig. 3    Compare to Figs. 3 and 5 of the ‘855 patent</p>
<p>36. A heater according to claim 35 further comprising a plurality of vertical columns.</p>	<p>p. 8, l. 15-16  “the invention anticipates a plurality of vertical columns, not necessarily only two”</p>
<p>37. A heater according to claim 33 wherein said heating conduit comprises a plurality of continuous and generally horizontal tubes sequentially linked together by a plurality of tube bends extending from a heater inlet at the bottom of said radiant section to an outlet at the top of said radiant section.</p>	<p>p. 4, l. 11-13  “tube bundle including a plurality of continuous horizontal tubes . . . sequentially linked together by a plurality of tube bends”  p. 8, l. 1-2  “generally horizontal heater tubes”  p. 8, l. 6-11  see above</p>

38. A heater according to claim 37 wherein at least a portion of said tubes are arranged in two offset vertical columns having a serpentine pattern.

p. 4, l. 13-15

“where at least a portion of the tubes are arranged in a plurality of vertical columns and are horizontally offset from one another”

p. 9, l. 26

“two offset vertical columns”

Abstract;

“It has been discovered that the tubes within a radiant heating section of a coking furnace can be advantageously arranged differently than in a single vertical column and connected together in a simple, planar serpentine pattern.”

Fig. 2

(see “serpentine-like” configuration of tubing)

If the Examiner has any further questions relating to this Amendment or to the application in general, he[*she*] is respectfully requested to contact the agent of record by telephone.

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Respectfully submitted  
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